

# HELKAMA



## Industrial Cables

2009



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*Helkama cable factory in Hanko, Finland.*





# **HELKAMA**

**– your reliable partner  
in cables**

*Welcome to the world of cables!*

*This brochure introduces our instrumentation, fire resistant and fibre optical cables.*

*The cables are manufactured by Helkama Bica Oy, a family-owned company currently being run by the fourth generation. Cables have been produced for more than 40 years by the Helkama Group, which itself is over 100 years old.*

*The Helkama name stands for quality, flexibility and personal service. We focus on our customers' needs and short delivery times.*

*Since time is of essence in today's world, we keep stock of the most common instrumentation, fire resistant and fibre optical cables, which enables us to respond immediately to our customers' needs. Although a cable is not normally a major cost in a project, a missing cable can be extremely expensive. This is why our experienced personnel are trained to go that extra mile to satisfy the needs of our customers – your needs!*

*Our RE-instrumentation cables have the GOST R certificate required for the Russian market.*

*For more details, see the cable data sheets in this brochure. If you cannot find a cable matching your needs in this brochure, we are open to discussing the possibilities of manufacturing one to your requirements.*

*HELKAMA – today, tomorrow...and in the future!*

# RE-2Y(St)Yv and Yv-fl 1 – 24 pairs



## Instrumentation cable according to EN 50288-7

<b>General</b>	Collective screened cable for instrumentation, control and communication applications.		
<b>Conductor</b>	Annealed copper solid or stranded		
<b>Insulation</b>	Extruded PE. Nominal wall thickness 0,4 mm. Insulation colors white and black, white colors numbered 1, 2...n- according to number of pairs		
<b>Twisting</b>	Two insulated conductors twisted together		
<b>Stranding</b>	Pairs twisted together. Construction of two pairs is made as a quad or two pairs. Polyester tape applied on the strand. 24 µm Al-polyester tape applied as a screen over the polyester tape. 7x0,30 tinned copper drain wire under the screen.		
<b>Sheath</b>	Extruded PVC		
	Nominal wall thickness	cable Ø ≤24 mm	1,8 mm
		cable Ø >24 mm	2,0 mm
<b>Physical properties</b>	Flame retardant	IEC 60332-1-2	RE-2Y(St)Yv and RE-2Y(St)Yv-fl
		IEC 60332-3-24	RE-2Y(St)Yv-fl
	Installation temperature range	-5 °C to 50 °C	
	Operation temperature range	-30 °C to 70 °C	
	Min. bending radius	7,5 x cable Ø	
	Sunlight resistance	UL 1581 section 1200	
	Oil resistance	ICEA S-82-552/NEMA WC 55	
<b>Identification</b>	Lot number, cable type, cable size, production month, year, manufacturer's name and meter marking printed on the sheath		

## Electrical properties

		Unit	0,8 mm	1,29 mm	0,5 mm <sup>2</sup>	0,75 mm <sup>2</sup>	1,0 mm <sup>2</sup>	1,3 mm <sup>2</sup>	1,5 mm <sup>2</sup>	2,5 mm <sup>2</sup>
Conductor size	nom.									
Conductor loop res.	max.	ohm/km	73,6	28,4	78,4	49,2	37,2	28,4	25,2	15,2
Insulation resistance	min.	Mohmxkm	5000	5000	5000	5000	5000	5000	5000	5000
<b>Mutual capacitance</b>										
cable of one pair	max.	nF/km	120	120	120	120	120	120	120	120
cable of 2 to 4 pairs	max.	nF/km	100	100	100	100	100	100	100	100
cables above 4 pairs	max.	nF/km	80	80	80	80	80	80	80	80
L/R ratio	max.	µH/ohm	25	40	25	25	25	40	40	80
<b>Test voltage</b>										
Conductor/conductor	min.	VDC 30s	4000	4000	4000	4000	4000	4000	4000	4000
Conductor/screen	min.	VDC 30s	2000	2000	2000	2000	2000	2000	2000	2000
Operating voltage (Ueff)	max.	V	300	300	300	300	300	300	300	300

Number of pairs	0,5 mm <sup>2</sup>		0,75 mm <sup>2</sup>		1,0 mm <sup>2</sup>		1,3 mm <sup>2</sup>		1,5 mm <sup>2</sup>	
	Outer Ø nom. mm	Weight nom. kg/km	Outer Ø nom. mm	Weight nom. kg/km	Outer Ø nom. mm	Weight nom. kg/km	Outer Ø nom. mm	Weight nom. kg/km	Outer Ø nom. mm	Weight nom. kg/km
1	7,3	60	7,7	70	8,2	80	8,4	90	9,3	125
2	9,8	110	10,6	130	11,2	140	11,7	180	12,8	185
4	11,5	140	11,8	155	12,6	195	13,3	220	14,6	265
8	13,4	210	14,5	250	15,5	315	16,6	365	18,2	360
12	15,5	280	16,9	350	18,2	425	19,3	505	21,6	590
16	17,3	335	18,9	430	20,3	535	21,7	630	24,5	775
24	20,2	450	22,2	600	24,5	780	26,3	930	29,2	1120

Technical data of triples, other conductor dimensions and number of pairs will be stated on request.

# RE-2Y(St)Yö 1 – 24 pairs



## Instrumentation cable according to EN 50288-7

<b>General</b>	Oil resistant collective screened cable for instrumentation, control and communication applications.	
<b>Conductor</b>	Annealed copper solid or stranded	
<b>Insulation</b>	Extruded PE. Nominal wall thickness 0,4 mm. Insulation colors white and black, white colors numbered 1, 2...n- according to number of pairs	
<b>Twisting</b>	Two insulated conductors twisted together	
<b>Stranding</b>	Pairs twisted together. Construction of two pairs is made as a quad or two pairs. Polyester tape applied on the strand. 24 µm Al-polyester tape applied as a screen over the polyester tape. 7x0,30 tinned copper drain wire under the screen.	
<b>Sheath</b>	Extruded oil resistance PVC	
	Nominal wall thickness	cable Ø ≤24 mm 1,8 mm cable Ø >24 mm 2,0 mm
<b>Physical Properties</b>	Flame retardant	IEC 60332-1-2
	Mineral oil resistant	VDE 0472 Teil 803, IEC 60811-2-1 Clause 10
	Installation temperature range	-5 °C to 50 °C
	Operation temperature range	-30 °C to 70 °C
	Min. bending radius	7,5 x cable Ø
	Sunlight resistance	UL 1581 section 1200
<b>Identification</b>	Lot number, cable type, cable size, production month, year, manufacturer's name and meter marking printed on the sheath	

## Electrical properties

		Unit	0,8 mm	1,29 mm	0,5 mm <sup>2</sup>	0,75 mm <sup>2</sup>	1,0 mm <sup>2</sup>	1,3 mm <sup>2</sup>	1,5 mm <sup>2</sup>	2,5 mm <sup>2</sup>
Conductor size	nom.									
Conductor loop res.	max.	ohm/km	73,6	28,4	78,4	49,2	37,2	28,4	25,2	15,2
Insulation resistance	min.	Mohmxkm	5000	5000	5000	5000	5000	5000	5000	5000
<b>Mutual capacitance</b>										
cable of one pair	max.	nF/km	110	110	110	110	110	110	110	110
cable of 2 to 4 pairs	max.	nF/km	90	90	90	90	90	90	90	90
cables above 4 pairs	max.	nF/km	70	70	70	70	70	70	70	70
L/R ratio	max.	µH/ohm	25	40	25	25	25	40	40	80
<b>Test voltage</b>										
Conductor/conductor	min.	VDC 30s	4000	4000	4000	4000	4000	4000	4000	4000
Conductor/screen	min.	VDC 30s	2000	2000	2000	2000	2000	2000	2000	2000
Operating voltage (Ueff)	max.	V 300	300	300	300	300	300	300	300	

Number of pairs	0,5 mm <sup>2</sup>		0,75 mm <sup>2</sup>		1,0 mm <sup>2</sup>		1,3 mm <sup>2</sup>		1,5 mm <sup>2</sup>	
	Outer Ø nom. mm	Weight nom. kg/km	Outer Ø nom. mm	Weight nom. kg/km	Outer Ø nom. mm	Weight nom. kg/km	Outer Ø nom. mm	Weight nom. kg/km	Outer Ø nom. mm	Weight nom. kg/km
1	7,3	50	7,8	52	7,7	70	8,2	80	8	95
2	8,8	90	8,4	95	10,6	130	11,2	140	10	145
4	11,4	140	11,5	145	11,8	155	12,6	195		
6	13,2	190	13,5	195	14,5	250	15,5	315		
8	14,0	220	14,3	225	16,9	350	18,2	425		
12	16,2	290	16,5	295	18,9	430	20,3	535		
16	18,0	360	18,5	365	22,2	600	24,5	780		
24	21,3	495	22,3	505						

Technical data of triples, other conductor dimensions and number of pairs will be stated on request.

# RE-2Y(St)Yv-fl PiMF 1 – 24 pairs



## Instrumentation cable according to EN 50288-7

<b>General</b>	Individually and collective screened cable for instrumentation, control and communication applications.	
<b>Conductor</b>	Annealed stranded copper conductor	
<b>Insulation</b>	Extruded PE. Nominal wall thickness 0,4 mm. Insulation colors white and black, white colors numbered 1, 2...n- according to number of pairs.	
<b>Twisting</b>	Two insulated conductors white and black stranded together and covered with a polyester tape	
<b>Pair shielding</b>	Solid ground conductor $\varnothing$ 0,6 mm, al-polyester tape and a polyester tape applied on the pairs.	
<b>Stranding</b>	Pairs twisted together. Polyester tape applied on the strand. 24 $\mu$ m al-polyester tape applied as a screen over the polyester tape. 7x0,30 tinned copper drain wire under the screen.	
<b>Sheath</b>	Extruded flame retardant PVC	
	Nominal wall thickness	cable $\varnothing$ $\leq$ 24 mm 1,8 mm cable $\varnothing$ >24 mm 2,0 mm
<b>Physical properties</b>	Flame retardant	IEC 60332-1-2, IEC 60332-3-24
	Installation temperature	-5°C... +50°C
	Min. bending radius	7,5 x cable $\varnothing$
	Sunlight resistance	UL 1581 section 1200
	Oil resistance	ICEA S-82-552/NEMA WC 5
<b>Identification</b>	Lot number, cable type, cable size, production month, year, manufacturer's name and meter marking printed on the sheath	

## Electrical properties

		Unit	0,5 mm <sup>2</sup>	0,75 mm <sup>2</sup>	1,3 mm <sup>2</sup>	1,5 mm <sup>2</sup>
Conductor size	nom.					
Conductor loop res.	max.	ohm/km	39,2	24,6	14,2	7,28
Insulation resistance	min.	Mohmxkm	5000	5000	5000	5000
<b>Mutual capacitance (800Hz)</b>						
cable of one pair	max.	nF/km	120	120	120	120
cable of 2 to 4 pairs	max.	nF/km	100	100	100	100
cables above 4 pairs	max.	nF/km	80	80	80	80
L/R ratio	max.	$\mu$ H/ohm	25	25	40	40
<b>Test voltage</b>						
Conductor/conductor	min.	VDC 30s	4000	4000	4000	4000
Conductor/screen	min.	VDC 30s	2000	2000	2000	2000
Operating voltage (Ueff)	max.	V	300	300	300	300

Number of pairs	0,5 mm <sup>2</sup>		0,75 mm <sup>2</sup>		1,3 mm <sup>2</sup>		1,5 mm <sup>2</sup>	
	Outer $\varnothing$ nom. mm	Weight nom. kg/km	Outer $\varnothing$ nom. mm	Weight nom. kg/km	Outer $\varnothing$ nom. mm	Weight nom. kg/km	Outer $\varnothing$ nom. mm	Weight nom. kg/km
2	9,3	102,0	10,0	119,3	11,1	150,9	11,5	163,2
4	10,9	149,8	12,5	185,9	14,0	244,3	14,6	269,1
8	13,3	236,8	16,0	306,3	18,2	414,7	19,1	461,4
12	15,4	323,0	18,8	419,9	21,5	578,4	22,5	647,2
16	19,1	423,0	21,1	530,1	24,2	736,9	25,4	827,2
20	18,7	486,7	23,1	638,1	26,6	893,1	27,9	1004,8
24	20,1	555,9	24,9	746,4	28,7	1047,0	30,17	1179,8

Technical data of triples, other conductor dimensions and number of pairs will be stated on request.

# RE-2Y(C)Yv-fl NEW TYPE 1 – 24 pairs



## Instrumentation cable according to en 50288-7

<b>General</b>	Collective screened cable for instrumentation, control and communication applications.	
<b>Conductor</b>	Annealed copper solid or stranded	
<b>Insulation</b>	Extruded PE. Nominal wall thickness 0,4 mm. Colors white and black with numbers on white cores 1, 2...n- according to number of pairs.	
<b>Twisting</b>	Two insulated conductors twisted together	
<b>Stranding</b>	Pairs twisted together. Polyester tape applied on the strand.	
<b>Wrapping</b>	At least 1 layer of plastic tape	
<b>Screen</b>	Tinned copper wire braid	
<b>Sheath</b>	Extruded flame retardant PVC, reinforced	
	Nominal wall thickness	cable Ø ≤24 mm 1,8 mm cable Ø >24 mm 2,0 mm
	Colour of sheath: black or blue	
<b>Physical properties</b>	Flame retardant	IEC 60332-1-2
	Installation temperature range	-5 °C to +50 °C
	During operation	-30 °C to +70 °C
	Min. bending radius	7,5 x cable Ø
	Sunlight resistance	UL 1581 section 1200
	Oil resistance	ICEA S-82-552/NEMA WC 55
<b>Identification</b>	Lot number, cable type, cable size, production month, year, manufacturer's name and meter marking printed on the sheath	

## Electrical properties

		Unit	0,5 mm <sup>2</sup>	0,75 mm <sup>2</sup>	1,0 mm <sup>2</sup>	1,3 mm <sup>2</sup>
Conductor size	nom.		0,5 mm <sup>2</sup>	0,75 mm <sup>2</sup>	1,0 mm <sup>2</sup>	1,3 mm <sup>2</sup>
Conductor loop res.	max.	ohm/km	39,2	24,6	18,1	14,2
Insulation resistance	min.	Mohmxkm	5000	5000	5000	5000
<b>Mutual capacitance (800Hz)</b>						
cable of one pair	max.	nF/km	120	120	120	120
cable of 2 to 4 pairs	max.	nF/km	100	100	100	100
cables above 4 pairs	max.	nF/km	80	80	80	80
L/R ratio	max.	µH/ohm	25	25	25	40
<b>Test voltage</b>						
Conductor/conductor	min.	VDC 30s	4000	4000	4000	4000
Conductor/screen	min.	VDC 30s	2000	2000	2000	2000
Operating voltage (Ueff)	max.	V	300	300	300	300

Number of pairs	0,5 mm <sup>2</sup>		0,75 mm <sup>2</sup>		1,0 mm <sup>2</sup>		1,3 mm <sup>2</sup>	
	Outer Ø nom. mm	Weight nom. kg/km	Outer Ø nom. mm	Weight nom. kg/km	Outer Ø nom. mm	Weight nom. kg/km	Outer Ø nom. mm	Weight nom. kg/km
1	8,3	109,8	8,7	118,7	9,4	130,5	9,7	139,7
2	10,7	143,0	11,4	160,7	12,3	183,9	12,9	203,9
3	11,1	158,9	11,9	185,0	12,8	214,3	13,5	241,6
4	11,9	181,3	12,7	214,4	13,7	250,7	14,5	285,3
6	13,6	230,1	14,6	278,2	15,6	326,1	16,7	375,1
8	14,2	263,9	15,4	323,9	16,4	382,3	17,4	443,7
12	16,4	342,6	17,8	427,4	19,0	511,3	20,2	599,2
16	18,2	417,5	19,8	526,2	21,2	636,1	22,6	750,1
20	19,7	487,2	21,5	622,5	23,5	775,3	25,1	916,1
24	21,1	557,2	23,1	714,4	25,3	891,9	27,0	1064,3

Technical data of triples, other conductor dimensions and number of pairs will be stated on request.

# RE-2Y(C)Y-fl

NEW TYPE

1 – 24 pairs



## Instrumentation cable according to en 50288-7

**General** Collective screened cable for instrumentation, control and communication applications.

**Conductor** Annealed copper solid or stranded

**Insulation** Extruded PE. Nominal wall thickness 0,4 mm. Colors white and black with numbers on white cores 1, 2...n- according to number of pairs.

**Twisting** Two insulated conductors twisted together

**Stranding** Pairs twisted together. Polyester tape applied on the strand.

**Wrapping** At least 1 layer of plastic tape

**Screen** Tinned copper wire braid

**Sheath** Extruded flame retardant PVC

Nominal wall thickness

cable Ø ≤16 mm	1,2 mm
cable Ø ≤22 mm	1,4 mm
cable Ø >22 mm	1,6 mm

Colour of sheath: black or blue

**Physical properties** Flame retardant IEC 60332-1-2

Installation temperature range -5 °C to +50 °C

During operation -30 °C to +70 °C

Min. bending radius 7,5 x cable Ø

Sunlight resistance UL 1581 section 1200

Oil resistance ICEA S-82-552/NEMA WC 55

**Identification** Lot number, cable type, cable size, production month, year, manufacturer's name and meter marking printed on the sheath

## Electrical properties

		Unit				
Conductor size	nom.		0,5 mm <sup>2</sup>	0,75 mm <sup>2</sup>	1,0 mm <sup>2</sup>	1,3 mm <sup>2</sup>
Conductor loop res.	max.	ohm/km	39,2	24,6	18,1	14,2
Insulation resistance	min.	Mohm×km	5000	5000	5000	5000
<b>Mutual capacitance (800Hz)</b>						
cable of one pair	max.	nF/km	120	120	120	120
cable of 2 to 4 pairs	max.	nF/km	100	100	100	100
cables above 4 pairs	max.	nF/km	80	80	80	80
L/R ratio	max.	µH/ohm	25	25	25	40
<b>Test voltage</b>						
Conductor/conductor	min.	VDC 30s	4000	4000	4000	4000
Conductor/screen	min.	VDC 30s	2000	2000	2000	2000
Operating voltage (Ueff)	max.	V	300	300	300	300

Number of pairs	0,5 mm <sup>2</sup>		0,75 mm <sup>2</sup>		1,0 mm <sup>2</sup>		1,3 mm <sup>2</sup>	
	Outer Ø nom. mm	Weight nom. kg/km	Outer Ø nom. mm	Weight nom. kg/km	Outer Ø nom. mm	Weight nom. kg/km	Outer Ø nom. mm	Weight nom. kg/km
1	7,1	89,1	7,5	97,2	8,2	107,0	8,5	115,4
2	9,5	115,8	10,2	132,4	11,1	152,0	11,7	170,8
3	9,9	130,6	10,7	155,7	11,6	180,8	12,3	206,9
4	10,7	150,9	11,6	183,4	12,5	214,6	13,3	247,7
6	12,4	195,2	13,5	242,1	14,6	283,7	15,5	331,6
8	13,0	227,2	14,3	286,0	15,2	338,0	16,6	412,8
12	15,2	300,2	17,1	399,2	18,2	475,4	19,4	563,0
16	17,4	385,7	19,1	495,3	20,4	595,4	21,8	709,5
20	18,9	452,5	20,8	589,2	22,7	729,5	24,3	870,7
24	20,3	520,0	22,8	699,3	24,5	841,9	26,2	1015,3

Technical data of triples, other conductor dimensions and number of pairs will be stated on request.

# RE-2Y(C)Y-fl

NEW  
TYPE

2 – 24 pairs



## Instrumentation cable according to en 50288-7

<b>General</b>	Collective screened cable for instrumentation, control and communication applications.		
<b>Conductor</b>	Annealed copper solid		
<b>Insulation</b>	Extruded PE. Nominal wall thickness 0,4 mm. Colors white and black with numbers on white cores 1, 2...n- according to number of pairs.		
<b>Twisting</b>	Two insulated conductors twisted together		
<b>Stranding</b>	Pairs twisted together. Polyester tape applied on the strand.		
<b>Wrapping</b>	At least 1 layer of plastic tape		
<b>Screen</b>	Tinned copper wire braid		
<b>Sheath</b>	Extruded flame retardant PVC		
	Nominal wall thickness	cable $\varnothing \leq 16$ mm	1,2 mm
		cable $\varnothing \leq 22$ mm	1,4 mm
		cable $\varnothing > 22$ mm	1,6 mm
	Colour of sheath: black or blue		
<b>Physical properties</b>	Flame retardant	IEC 60332-1-2	
	Installation temperature range	-5 °C to +50 °C	
	During operation	-30 °C to +70 °C	
	Min. bending radius	7,5 x cable $\varnothing$	
	Sunlight resistance	UL 1581 section 1200	
	Oil resistance	ICEA S-82-552/NEMA WC 55	
<b>Identification</b>	Lot number, cable type, cable size, production month, year, manufacturer's name and meter marking printed on the sheath		

## Electrical properties

		Unit	
Conductor size $\varnothing$	nom.		0,8 mm
Conductor loop res.	max.	ohm/km	73,6
Insulation resistance	min.	Mohm $\times$ km	5000
<b>Mutual capacitance (800Hz)</b>			
cable of 2 to 4 pairs	nom.	nF/km	80
cables above 4 pairs	nom.	nF/km	60
L/R ratio	max.	$\mu$ H/ohm	25
<b>Test voltage</b>			
Conductor/conductor	min.	VDC 30s	4000
Conductor/screen	min.	VDC 30s	2000
Operating voltage (Ueff)	max.	V	300

Number of pairs	Outer $\varnothing$	Weight
	nom. mm	nom. kg/km
	0,8 mm	
2	9,1	114,0
3	9,5	129,0
4	10,1	142,0
6	11,9	189,0
8	12,9	232,0
12	14,9	305,2
16	16,6	374,0
20	18,0	441,0
24	19,4	505,0

Technical data of triples, other conductor dimensions and number of pairs will be stated on request.

# RE-2Y(L)2Y

NEW TYPE

1 – 24 pairs



## Instrumentation cable

<b>General</b>	Collective screened cable for instrumentation, control and communication applications.		
<b>Conductor</b>	Annealed copper solid or stranded		
<b>Insulation</b>	Extruded PE. Nominal wall thickness 0,4 mm. Insulation colors white and black, white colors numbered 1, 2...n- according to number of pairs.		
<b>Twisting</b>	Two insulated conductors twisted together		
<b>Stranding</b>	Pairs twisted together. Construction of two pairs is made as a quad or two pairs. Polyester tape applied on the strand. ALPE40/150 Al-laminate tape applied as a screen over the polyester tape. 7x0,30 tinned copper drain wire under the screen.		
<b>Sheath</b>	Extruded PE		
	Nominal wall thickness	cable $\varnothing \leq 24$ mm	1,8 mm
		cable $\varnothing > 24$ mm	2,0 mm
	Colour of sheath: black or blue		
<b>Physical properties</b>	Installation temperature range	-5 °C to +50 °C	
	Min. bending radius	7,5 x cable $\varnothing$	
<b>Identification</b>	Lot number, cable type, cable size, production month, year, manufacturer's name and meter marking printed on the sheath		

## Electrical properties

		Unit		
Conductor size	nom.		1,0 mm <sup>2</sup>	1,3 mm <sup>2</sup>
Conductor loop res.	max.	ohm/km	18,1	14,2
Insulation resistance	min.	Mohm x km	5000	5000
<b>Mutual capacitance (800Hz)</b>				
cable of one pair	max.	nF/km	120	120
cable of 2 to 4 pairs	max.	nF/km	100	100
cables above 4 pairs	max.	nF/km	80	80
L/R ratio	max.	$\mu$ H/ohm	40	40
<b>Test voltage</b>				
Conductor/conductor	min.	VDC 30s	4000	4000
Conductor/screen	min.	VDC 30s	2000	2000
Operating voltage (Ueff)	max.	V	300	300

Number of pairs	Outer $\varnothing$ nom. mm		Weight nom. kg/km	
	1,0 mm <sup>2</sup>		1,3 mm <sup>2</sup>	
1	9,3	85,0	9,5	91,0
2	11,7	117,0	11,5	126,0
4	13,0	172,8	13,5	195,0
6	14,4	227,7	15,5	265,0
8	15,6	283,6	16,5	332,0
12	18,1	387,2	19,0	460,0
16	20,2	495,6	21,5	595,0
24	23,8	695,9	25,5	840,0

Technical data of triples, other conductor dimensions and number of pairs will be stated on request.

# RE-2Y(L)2YY NEW TYPE 1 – 24 pairs



## Instrumentation cable

<b>General</b>	Collective screened cable for instrumentation, control and communication applications.	
<b>Conductor</b>	Annealed copper solid or stranded	
<b>Insulation</b>	Extruded PE. Nominal wall thickness 0,4 mm. Insulation colors white and black, white colors numbered 1, 2...n- according to number of pairs.	
<b>Twisting</b>	Two insulated conductors twisted together	
<b>Stranding</b>	Pairs twisted together. Construction of two pairs is made as a quad or two pairs. Polyester tape applied on the strand. ALPE40/150 Al-laminate tape applied as a screen over the polyester tape. 7x0,30 tinned copper drain wire under the screen.	
<b>Inner sheath</b>	Extruded PE	
	Nominal wall thickness	cable $\varnothing \leq 24$ mm 1,8 mm cable $\varnothing > 24$ mm 2,0 mm
<b>Outer sheath</b>	PVC. Colour of sheath: black or blue	
<b>Physical properties</b>	Installation temperature range	-5 °C to +50 °C
	Min. bending radius	7,5 x cable $\varnothing$
<b>Identification</b>	Lot number, cable type, cable size, production month, year, manufacturer's name and meter marking printed on the sheath	

## Electrical properties

		Unit			
Conductor size	nom.		0,75 mm <sup>2</sup>	1,0 mm <sup>2</sup>	1,3 mm <sup>2</sup>
Conductor loop res.	max.	ohm/km	24,6	18,1	14,2
Insulation resistance	min.	Mohmxkm	5000	5000	5000
<b>Mutual capacitance (800Hz)</b>					
cable of one pair	max.	nF/km	100	100	100
cable of 2 to 4 pairs	max.	nF/km	90	90	90
cables above 4 pairs	max.	nF/km	70	70	70
L/R ratio	max.	$\mu$ H/ohm	25	25	40
<b>Test voltage</b>					
Conductor/conductor	min.	VDC 30s	4000	4000	4000
Conductor/screen	min.	VDC 30s	2000	2000	2000
Operating voltage (Ueff)	max.	V	300	300	300

Number of pairs	0,75 mm <sup>2</sup>		1,0 mm <sup>2</sup>		1,3 mm <sup>2</sup>	
	Outer $\varnothing$ nom. mm	Weight nom. kg/km	Outer $\varnothing$ nom. mm	Weight nom. kg/km	Outer $\varnothing$ nom. mm	Weight nom. kg/km
1	9,9	86,4	11,6	137,6	11,7	138,8
2	12,9	148,5	13,1	163,1	13,6	178,2
4	13,7	191,9	14,8	231,4	15,2	251,8
6	15,5	252,2	16,3	293,0	18,1	348,9
8	16,4	290,1	17,8	355,6	18,4	400,8
12	20,1	443,2	20,8	492,2	22,6	610,4
16	21,4	495,9	22,9	610,4	23,9	704,3
20	23,9	633,0	25,1	757,3	26,6	879,6
24	25,5	721,9	26,8	863,0	28,9	1038,9

Technical data of triples, other conductor dimensions and number of pairs will be stated on request.

# NOVAK/NOVAK-HF



**Cable for instrumentation, process control and computer systems, fixed installation**

<b>Electrical properties</b>	Pair DC resistance (+20°C) max. 81 ohm/km Nominal pair capacitance (800 Hz) 80 nF/km Insulation resistance min. 100 Mohm x km
<b>Conductor</b>	Annealed, tinned copper 0,5 mm <sup>2</sup> /7 x 0,3 mm
<b>Insulation</b>	PE, nominal wall thickness 0,25 mm
<b>Twisting</b>	Two conductors twisted together. Each pair has a different lay. Pair identification with a colour code and an identification number.
<b>Pair colour codes</b>	Orange/white
<b>Pair numbers</b>	Each pair has an identification number
<b>Units</b>	Units consisting of 4 pairs twisted together Unit identification with a numbered tape
<b>Stranding</b>	Groups cabled together and covered with a polyester tape
<b>Shielding</b>	Plastic coated aluminium tape over a ground conductor 7x0,3 mm
<b>Sheath</b>	NOVAK: Flame retardant PVC, light grey NOVAK-HF: Flame retardant, halogen-free polyolefine plastic, light grey.
<b>Rated voltage</b>	75 V
<b>Identification</b>	Lot number, cable type, cable size, production month, year, manufacturer's name and meter marking printed on the sheath

Conductors	Nominal outer ∅ mm	Nominal weight kg/km	Standard delivery length m
2 x 2 x 0,5 + 0,5	8,5	64	1000
4 x 2 x 0,5 + 0,5	9,5	100	1000
8 x 2 x 0,5 + 0,5	14,0	165	1000
12 x 2 x 0,5 + 0,5	14,5	225	1000
24 x 2 x 0,5 + 0,5	20,0	415	1000



## Cable for instrumentation, process control and computer systems

Designed for the transmission of digital and low-level analog signals, providing excellent protection against electromagnetic interference. Armouring with galvanized steel tapes.

<b>Electrical properties</b>	Pair DC resistance (+20°C) max. 81 ohm/km Nominal pair capacitance (800 Hz) 80 nF/km Insulation resistance min. 100 Mohm x km
<b>Conductor</b>	Annealed, tinned copper 0,5 mm <sup>2</sup> /7x0,3 mm
<b>Insulation</b>	PE, nominal wall thickness 0,25 m.
<b>Twisting</b>	Two conductors twisted together. Each pair has a different lay. Pair identification with a colour code and an identification number.
<b>Pair colour codes</b>	Orange/white
<b>Pair numbers</b>	Each pair has an identification number
<b>Units</b>	Units consisting of 4 pairs twisted together Unit identification with a numbered tape
<b>Stranding</b>	Groups cabled together and covered with a polyester tape
<b>Shielding</b>	Plastic coated aluminium tape over a ground conductor 7x0,3 mm
<b>Inner sheath</b>	Flame retardant PVC, light grey
<b>Armouring</b>	Two 0,2 mm zinc-coated steel tapes
<b>Sheath</b>	Flame retardant PVC, black
<b>Rated voltage</b>	75 V
<b>Identification</b>	Lot number, cable type, cable size, production month, year, manufacturer's name and meter marking printed on the sheath

Conductors	Nominal outer Ø mm	Nominal weight kg/km	Standard delivery length m
4 x 2 x 0,5 + 0,5	12,7	232	1000
8 x 2 x 0,5 + 0,5	16,6	362	1000
12 x 2 x 0,5 + 0,5	18,0	457	1000
24 x 2 x 0,5 + 0,5	24,0	760	1000

# KJAAM/KJAAM-HF



**Cable for instrumentation, process control, computer and sound reproduction systems. Designed for the transmission of digital and low-level analog signals, providing excellent protection against electromagnetic interference.**

<b>Electrical properties</b>	Pair DC resistance (+20°C) max. 81 ohm/km Nominal pair capacitance (800 Hz) 80 nF/km Insulation resistance min. 2 Gohm x km
<b>Conductor</b>	Annealed, tinned copper 0,5 mm <sup>2</sup> /7x0,3 mm
<b>Insulation</b>	Solid PE, nominal wall thickness 0,35 mm
<b>Twisting</b>	Two cores blue/red and a ground conductor 7x0,3 mm stranded together with a short lay
<b>Pair shielding</b>	Aluminium foil covered with a numbered tape and a polyester tape
<b>Stranding</b>	Pairs stranded together and covered with a polyester tape
<b>Shielding</b>	Plastic coated aluminium tape over a ground conductor 7x0,3 mm
<b>Sheath</b>	KJAAM: Flame retardant PVC, light grey KJAAM-HF: Flame retardant, halogen-free polyolefine plastic, light grey
<b>Rated voltage</b>	75 V
<b>Identification</b>	Lot number, cable type, cable size, production month, year, manufacturer's name and meter marking printed on the sheath

Conductors	Nominal outer Ø mm	Nominal weight kg/km	Standard delivery length m
1 x (2+1) x 0,5 + 0,5	4,8	31	1000
2 x (2+1) x 0,5 + 0,5	8,5	75	1000
4 x (2+1) x 0,5 + 0,5	10,0	120	1000
8 x (2+1) x 0,5 + 0,5	13,5	210	1000
12 x (2+1) x 0,5 + 0,5	15,5	295	1000
24 x (2+1) x 0,5 + 0,5	22,0	575	1000

# KJAAM GM

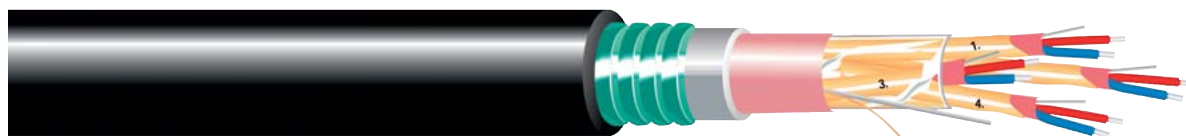


**Cable for instrumentation, process control, computer and sound reproduction systems. Designed for the transmission of digital and low-level analog signals, providing excellent protection against electromagnetic interference. Armouring with galvanized steel tapes.**

<b>Electrical properties</b>	Pair DC resistance (+20°C) max. 81 ohm/km Nominal pair capacitance (800 Hz) 80 nF/km Insulation resistance min. 2 Gohm x km
<b>Conductor</b>	Annealed, tinned copper 0,5 mm <sup>2</sup> /7x0,3 mm
<b>Insulation</b>	Solid PE, nominal wall thickness 0,35 mm
<b>Twisting</b>	Two cores blue/red and a ground conductor 7x0,3 mm stranded together with a short lay
<b>Pair shielding</b>	Aluminium foil covered with a numbered tape and a polyester tape
<b>Stranding</b>	Pairs stranded together and covered with a polyester tape
<b>Shielding</b>	Plastic coated aluminium tape over a ground conductor 7x0,3 mm
<b>Inner sheath</b>	Flame retardant PVC, light grey
<b>Armouring</b>	Two 0,2 mm zinc-coated steel tapes
<b>Sheath</b>	Flame retardant PVC, black
<b>Rated voltage</b>	75 V
<b>Identification</b>	Lot number, cable type, cable size, production month, year, manufacturer's name and meter marking printed on the sheath

Conductors	Nominal outer Ø mm	Nominal weight kg/km	Standard delivery length m
4 x (2+1) x 0,5 + 0,5	13,5	270	1000
8 x (2+1) x 0,5 + 0,5	17,0	390	1000
12 x (2+1) x 0,5 + 0,5	19,0	510	1000
24 x (2+1) x 0,5 + 0,5	25,0	840	1000

# KJAAM VDM NEW TYPE



**Cable for instrumentation, process control, computer and sound reproduction systems. Designed for the transmission of digital and low-level analog signals, providing excellent protection against electromagnetic interference. Armouring with corrugated steel tape.**

<b>Electrical properties</b>	Pair DC resistance (+20°C) max. 81 ohm/km Nominal pair capacitance (800 Hz) 80 nF/km Insulation resistance min. 2 Gohm x km
<b>Conductor</b>	Annealed, tinned copper 0,5 mm <sup>2</sup> /7x0,3 mm
<b>Insulation</b>	Solid PE, nominal wall thickness 0,35 mm
<b>Twisting</b>	Two cores blue/red and a ground conductor 7x0,3 mm stranded together with a short lay
<b>Pair shielding</b>	Aluminium foil covered with a numbered tape and a polyester tape
<b>Stranding</b>	Pairs stranded together and covered with a polyester tape
<b>Shielding</b>	Plastic coated aluminium tape over a ground conductor 7x0,3 mm
<b>Inner sheath</b>	Flame retardant PVC, light grey
<b>Armouring</b>	One 0,15 mm corrugated steel tape
<b>Sheath</b>	MDPE-sheat
<b>Rated voltage</b>	75 V
<b>Identification</b>	Lot number, cable type, cable size, production month, year, manufacturer's name and meter marking printed on the sheath

Conductors	Nominal outer Ø mm	Nominal weight kg/km	Standard delivery length m
4 x (2+1) x 0,5 + 0,5	14,2	221	1000

# HEVAK/HEVAK-HF



**Cable for instrumentation, process control and computer systems, fixed installation.**

<b>Electrical properties</b>	Pair DC resistance (+20°C) max. 81 ohm/km Nominal pair capacitance (800 Hz) 80 nF/km Insulation resistance min. 100 Mohm x km
<b>Conductor</b>	Annealed, tinned copper 0,5 mm <sup>2</sup> /7x0,3 mm
<b>Insulation</b>	PE, nominal wall thickness 0,25 mm
<b>Twisting</b>	Two conductors twisted together. Each pair has a different lay. Pair identification with a colour code and an identification number.
<b>Pair colour codes</b>	Blue/red, grey/yellow, green/brown, white/black
<b>Units</b>	Units consisting of 4 pairs twisted together Unit identification with a numbered tape
<b>Stranding</b>	Groups cabled together and covered with a polyester tape
<b>Shielding</b>	Plastic coated aluminium tape over a ground conductor 7x0,3 mm
<b>Sheath</b>	HEVAK: Flame retardant PVC, light grey HEVAK-HF: Flame retardant, halogen-free polyolefine plastic, light grey
<b>Rated voltage</b>	75 V
<b>Identification</b>	Lot number, cable type, cable size, production month, year, manufacturer's name and meter marking printed on the sheath

Conductors	Nominal outer Ø mm	Nominal weight kg/km	Standard delivery length m
2 x 2 x 0,5 + 0,5	8,5	64	1000
4 x 2 x 0,5 + 0,5	9,5	100	1000
8 x 2 x 0,5 + 0,5	14,0	165	1000
12 x 2 x 0,5 + 0,5	14,5	225	1000
24 x 2 x 0,5 + 0,5	20,0	415	1000

# KLM/KLMA / KLM-HF/KLMA-HF



**Cable for instrumentation, alarm systems and personal call finders, fixed installation.**

<b>Conductor</b>	Annealed, tinned copper $\varnothing$ 0,8 mm
<b>Insulation</b>	KLM/KLMA: PVC, nominal wall thickness 0,38 mm KLM-HF/KLMA-HF: PE, nominal wall thickness 0,38 mm
<b>Conductor identification</b>	1=blue, 2=yellow, 3=white, 4=red
<b>Stranding</b>	Conductors twisted together
<b>Shielding</b>	(For type KLMA) Plastic coated aluminium tape over a ground conductor $\varnothing$ 0,8 mm
<b>Sheath</b>	KLM / KLMA: Flame retardant PVC, light grey. KLM-HF/ KLMA-HF: Flame retardant, halogen-free polyolefine plastic, light grey.
<b>Rated voltage</b>	75 V
<b>Identification</b>	Lot number, cable type, cable size, production month, year, manufacturer's name and meter marking printed on the sheath

Conductors	Nominal outer $\varnothing$ mm	Nominal weight kg/km	Standard delivery length m
<b>KLM</b>			
2 x 0,8	5,7	43	600
4 x 0,8	6,0	51	600
<b>KLMA</b>			
2 x 0,8 + 0,8	5,0	35	600
4 x 0,8 + 0,8	6,0	47	600